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The Axial Skeleton of the Enteropneusta, Considered from a Functional Point of View: WILLIAM EMERSON RITTER, University of California. (Will appear in full in 'Scientific Results, Harriman Alaska Expedition.')

(1) The notochord is not restricted to the pouch-like organ present in the adults of all species and hitherto regarded as constituting the entire organ, but in reality extends back to the posterior end of the collar (fully developed in the adult of the Harrimaniidæ and rudimentary in other species). The collar notochord is mainly in the form of a broad, deep trough on the dorsal side of the esophagus, though histologically and functionally portions of the esophageal wall adjacent to the trough must be reckoned as belonging to the notochord. (2) The combined notochord and chondroid skeletal elements constitute a structural unit, this unit being a true *axial skeleton.* (3) This axial skeleton has a twofold function; (*a*) to serve as a firm rod for giving rigidity and strength to the peduncle of the animal, and to support, at its anterior end, the heart and glomerulus which are situated in the base of the proboscis; (*b*) to serve as the origin of the great radio-longitudinal muscles of the collar. (4) The important muscles above mentioned are attached to the sides of the axial skeleton along its entire length from the mid-peduncle to near the posterior end of the collar. They have an extensive insertion into the connective tissue of the collar, the septum between the collar and abdominal cœlom, and the collar ectoderm. These muscles are practically the only ones in the collar by which the boring and locomotor movements of the animal are effected there being in this region no body-wall muscles at all in some of the species. They are consequently true *skeletal muscles* acting on an *internal skeleton,* and *hence having no counterpart in any invertebrate,* but are comparable with the *axial skeletal musculature* of *vertebrates.* The functional significance of the axial skeleton as above defined has not been recognized heretofore, probably on account of the rudimentary condition of its esophageal portion in most species. In particular, its relation to the skeletal musculature has escaped adequate recognition. In the facts here briefly set forth we have evidence *as strong as that furnished by the branchial apparatus* in favor of the chordate affinities of the enteropneusta.

Evolution and Distribution of the Mastodons and Elephants in North America: HENRY FAIRFIELD OSBORN, Columbia University. (Will appear in full in *American Naturalist.*)

CH. WARDELL STILES,
Secretary.

SCIENTIFIC BOOKS.

The Elements of Insect Anatomy, an outline for the use of students in entomological laboratories. By JOHN HENRY COMSTOCK and VERNON L. KELLOGG. Third edition, revised. Ithaca, N. Y., Comstock Publishing Co. 1901.

Teachers of entomology will certainly welcome this revised edition of an excellent laboratory guide. In their selection of easily accessible types the authors have had in mind the convenience of instructors and classes throughout the country. The outlines are carefully constructed with a view to insuring accuracy of observation and include, perhaps, as much material as can be worked over during the time usually allotted to the subject in our colleges and universities. The work suffers somewhat from lack of symmetry. Thus before introducing the student to the maze of sclerites and other anatomical details, with which the outlines begin, it would have been desirable to insert a chapter on general morphology for the purpose of elucidating the important principles of metamerism, cephalization, etc. This could have been accomplished by constructing a number of brief comparative outlines of several insects repre-

senting the different natural orders, together with outlines of a few common myriopods and arachnids. The cockroach, in the opinion of many teachers, would furnish a more satisfactory paradigm of insect structure than the grasshopper. At any rate, the work would gain by including a full outline of both insects. The chapter on the mouth-parts should have been extended to include outlines of the alimentary tracts of several different insects and of some one holometabolic insect in its different instars. Good dissections of the alimentary tract are easily made by the beginner and are eminently instructive both anatomically and physiologically. The same is true of the reproductive organs of insects. While these additions would considerably increase the size of the book, they would also increase the opportunities for selection on the part of the teacher and student. *"Wer Vieles bringt, wird Manchem Etwas bringen"* is as true of insect anatomy as of any other extensive subject.

The chapter on the structure and venation of wings is excellent, as would be expected from the authors' valuable researches on these organs. This and the chapter on the mouth-parts are the only portions of the book in which the principles of comparison, which redeem the sterility of anatomical details, are really accentuated. The former chapter is also the only one that is at all adequately illustrated with clear, simple figures. The concluding chapter on histological methods is also excellent and will be useful to the student in other fields of animal morphology. One notes with pleasure that there are still investigators bold enough to prefer the cumbersome but accurate sliding microtomes to the unreliable rotatory machines of our laboratories. The authors have unfortunately omitted more than a mere reference to the celloidin method, which deserves much more attention in insect histology than it has received.

The outlines exhibit few inaccuracies in detail, and perhaps none as flagrant as those which characterize the table of correspondences between the male and female reproductive organs on p. 46. The seminal vesicles do not correspond, morphologically at least, to the egg calyces, and it is quite erroneous to describe the ejaculatory duct as 'the united vasa deferentia' and the vagina as 'the united oviducts.' The penis, moreover, is neither analogous nor homologous to the ovipositor, and it is difficult to see why these organs should be made to correspond to each other.

It is greatly to be regretted that the clear and straightforward English of the authors should be marred in this, as in the previous editions, by a belated propaganda for an anatomical nomenclature as inelegant as it is unnecessary. The increasing reluctance of American zoologists to use terms like 'proximad,' 'distad,' 'mesad,' etc., is significant and should have been heeded by the authors. The instructor is certainly to be commended who compels his students to translate all these university provincialisms into normal English before beginning to use the otherwise admirable outlines.

The typography, paper and especially the binding are all that can be desired in a laboratory guide.

W. M. Wheeler.

Neudrucke von Schriften und Karten über Meteorologie und Erdmagnetismus herausgegeben von Professor Dr. G. Hellmann. No. 14. *Meteorologische Optik.* Berlin, A. Asher and Co. 1902. 4to. Pp. xiv+107.

This, the latest and probably the last of the reprints of rare meteorological and magnetic memoirs to be published by Dr. Hellmann, treats of a subject that has not been considered before in the series and, since optical phenomena were among the earliest to be observed, the present memoirs extend over the long period from 1000 to 1836. The special subjects comprise first, four important memoirs on the rainbow, namely, by Theodoricus Teutonicus (1311), Descartes (1637), Newton (1704) and Airy (1836); two descriptions of the Brocken spectre and the white fog-bow by Ulloa and Bouguer (1744–48); three papers on halos, namely, descriptions of remarkable phenomena of this kind seen by Hevelius in Danzig (1672) and by Lowitz in St. Petersburg (1794), besides the fundamental essay of Fraunhofer (1825) on the formation of colored